SC26 Network Research Exhibition: Demonstration Publishable Abstract

DISK-TO-DISK FILE TRANSFER EXPERIMENT ON AN END-TO-END 400 GBPS LINE BETWEEN JAPAN AND THE USA BY MMCFTP

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Abstract

International collaboration drives modern science projects, demanding rapid data transfer across borders. To support this, academic networks are enhancing international lines. In April 2025, SINET6, a Japanese NREN, launched the first 400 Gbps international line across the Pacific Ocean. This experiment is the world's first data transfer trial between Japan and the USA to utilize a network configured with end-to-end 400G technology.

MMCFTP (Massively Multi-Connections File Transfer Protocol), developed by NII, is a powerful data transfer tool. In previous SCs, MMCFTP demonstrated transfers using multiple 100 Gbps lines. These experiments involved memory-to-memory data transfer and were not limited by server file I/O performance. The SC26 experiment will demonstrate disk-to-disk file transfers over a single 400 Gbps end-to-end line.

Goals

1. The target speed for disk-to-disk transfers will be 200 Gbps. The bottleneck of the disk-to-disk transfers is the storage I/O performance on the receiver server.
2. The target speed for disk-to-memory and memory-to-memory transfers will be 400 Gbps at peak. The international lines used for the experiment are not dedicated. We must limit transfer speed to avoid impacting other communications.

Network and Servers

- The network for the experiment (Fig.) will consist of 400G network technology from end to end. The Chicago end will be the NII booth (#1459), and the Japan end will be the RIKEN R-CCS in Kobe via the Kashiwa Campus of UTokyo. RIKEN and UTokyo are connected by NTT EAST/WEST's service: All-Photonics Connect powered by IOWN.
- Specification of Servers:

Model	Dell PowerEdge R7615
CPU	AMD EPYC 7354P (3.25 GHz, 32C/64T) x 1
Memory	768 GB (DDR5-4800 64GB x 12)
Data Disk	Chicago: NVMe M.2 SSD 2 TB x 12 (RAID 0) Kobe: NVMe M.2 SSD 2 TB x 16 (RAID 0)
NIC	NVIDIA ConnectX-7 (400 GbE) x1 (MTU:9000)
OS	AlmaLinux 8.10

Involved Parties

- Atsuko TAKEFUSA NII
- Takashi KURIMOTO, NII
- Keiji YAMAMOTO, RIKEN
- Akihiro NOMURA, RIKEN
- Hidetomo KANEYAMA, RIKEN
- Toshihiro HANAWA, UTokyo
- Isamu KOSEDA, UTokyo
- NTT EAST
- NTT WEST
- SCinet, Pacific Wave, and SINET6

- Equipment contributors: NICT (JGN) , NEC, and KAIT

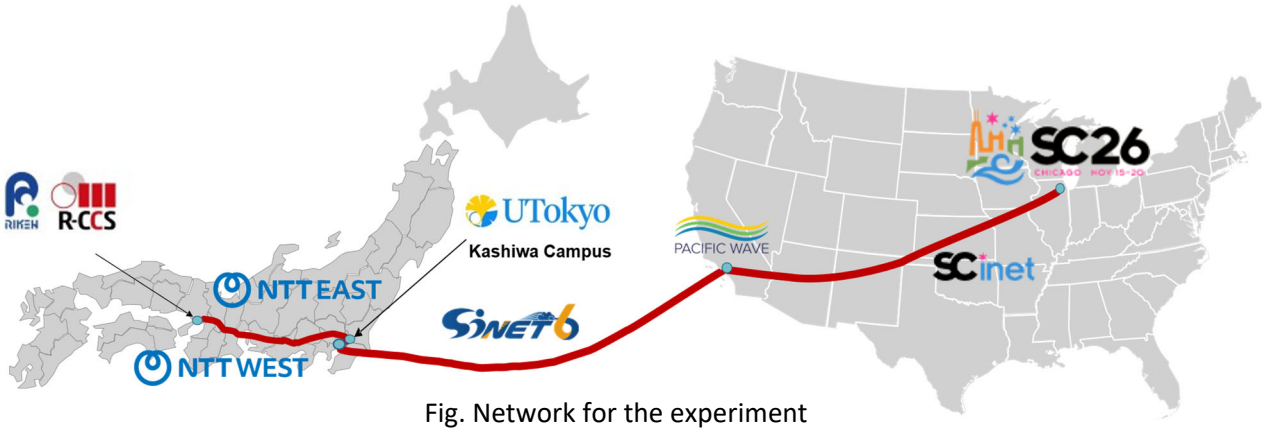


Fig. Network for the experiment